

intine 2 and intine 3. $\times 10000$; 3. The pollen wall of shedding pollen in *L. chinense*, showing nexine 2, intine 1 which containing small protein tubes, intine 2 and intine 3. $\times 12000$; 4. Pollen grain wall of *L. chinense*, on a line stigma 4h after pollination, showing microfibrillar increase in intine 3 and small protein tubes in intine 1. $\times 10000$; 5. Pollen wall at the germination aperture of *L. chinense*, on a line stigma, showing P-particles in the intine 3. $\times 7000$; 6. Same above, showing P-particles with thorns. $\times 20000$; 7. Pollen hydration wall of *L. tulipifera* a line stigma 4h after pollination, showing lipid bodies and vesicles in the intine 3 and inflated smooth endoplasmic reticulum and vesicle population in vegetative cell plasma. $\times 10000$.

Plate II

1. Pollen hydration wall of *L. chinense*, 10 min after culturing, showing coated vesicle in the between intine 3 and plasma membrane and large coated vesicles and dictyosome and endoplasmic reticulum in the vegetative cell plasma. $\times 20000$; 2. Same above, showing coated vesicle in the out of plasma, and large coated vesicles and endoplasmic reticulum and starch plasts in the vegetative cell plasma. $\times 15000$; 3. The enlarging of Fig. 2., showing intine 3, new layer, coated vesicles and endoplasmic reticulum, note: the tater two being in the vegetative cell plasma. $\times 50000$; 4. Pollen tube of *L. tulipifera* in the a line stigma canal 4h after pollination, showing the relationship between pollen tube wall and pollen wall. $\times 2000$; 5. The enlarging of part of 4., showing thickened intine 2 around the germination aperture. $\times 8000$; 6. Pollen hydration wall of *L. chinense* 15 min after culturing, showing intine 3 full of lipid bodies and intine 1 without small protein tubes away from germination aperture. $\times 10000$; 7. Pollen hydration wall of *L. chinense* 10 min after culturing, showing intine without small protein tubes. $\times 30000$; 8. Pollen tube of *L. tulipifera* in a line stigma canal 8h after pollination, showing intine without small protein tubes away from germination aperture. $\times 10000$

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弓翅芹的化学成分*

饶高雄¹ 刘启新² 孙汉董³

(¹ 云南中医学院中药系, 昆明 650011) (² 江苏植物研究所, 南京 210014)

(³ 中国科学院昆明植物研究所, 昆明 650204)

CHEMICAL CONSTITUENT OF ARCUATOPTERUS FILIPEDICHLUS

RAO Gao-Xiong¹, LIU Qi-Xin², SUN Han-Dong³

(¹ Yunnan College of Traditional Chinese Medicine, Kunming 650204) (² Jiangsu Institute of Botany, Nanjing 210014)

(³ Kunming Institute of Botany, Chinese Academy of Sciences, Kunming 650204)

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伞形科弓翅芹属(*Arcuatopterus*)植物共 3 种, 特产中国西南, 其中弓翅芹 *Arcuatopterus filipedicellus* 是本属模式种, 也是较常见种, 其化学成分尚未研究过, 本文报道其化学成分。

样品采于云南省宾川县, 从其乙醇提取物中经硅胶柱层析得到 7 个化合物, 分别鉴定为香豆素化合物伞形花内酯(umbelliferone) (1), 甲氧基欧芹酚(osthol) (2), 考九里香素(coumurrayin) (3), 佛手柑内酯(bergapten) (4), 非香豆素化合物阿魏酸(ferulic acid) (5), 槲皮素(quercetin) (6), β -谷甾醇(β -sitosterol)。

实验部分

熔点用 Yanaca 显微熔点仪测定, 温度未校正。IR 用 PE-577 红外光谱仪测定。 ^1H NMR 用 FX-90Q 核磁共振仪测定, TMS 内标。柱层析硅胶为青岛海洋化工厂产品。

样品采于宾川鸡足山, 标本经鉴定为弓翅芹 *Arcuatopterus filipedicellus*。

弓翅芹全草 570 g 粉碎后以 95%乙醇回流提取 (1500 mL \times 3), 回收乙醇得褐色浸膏 38 g, 浸膏溶于适量甲醇, 以活性炭脱色, 回收甲醇得到脱色浸膏 23 g, 脱色后的提取物以硅胶柱层析, 用环己烷-乙酸乙酯溶剂系统洗脱, 得化合物 1 (40 mg), 2 (125 mg), 3 (70 mg), 4 (210 mg), 5 (15 mg), 6 (140 mg), 以及 β -谷甾醇 (30 mg)。

化合物 1: 白色针晶 (丙酮), mp 220—223 $^{\circ}\text{C}$, 和伞形花内酯标准品 (Sigma 公司) 对照, TLC, IR 一致。

化合物 2: 无色针晶 (丙酮), mp 81—82 $^{\circ}\text{C}$, 和甲氧基欧芹酚标准品^[1]对照, TLC, IR 一致。

化合物 3: 白色块晶 (丙酮), mp 152—154 $^{\circ}\text{C}$, 和考九里香素标准品^[1]对照, TLC, IR 一致。

化合物 4: 浅黄色针晶 (丙酮), mp 187—190 $^{\circ}\text{C}$, 和佛手柑内酯标准品^[1]对照, TLC, IR 一致。

化合物 5: 浅黄色针晶 (丙酮), mp 164—167 $^{\circ}\text{C}$, 和阿魏酸标准品^[1]对照, TLC, IR 一致。

化合物 6: 黄绿色针晶 (乙醇), mp 300 $^{\circ}\text{C}$ (分解), 三氯化铝反应, 盐酸镁粉反应均为阳性, $\text{IR}_{\text{max}}^{\text{KBr}} \text{cm}^{-1}$: 3300, 1670, 1620, 1520, 1470. ^1H NMR(DMSO- d_6) δ ppm: 7.68(1H, d, $J=1.6\text{Hz}$, 2'-H), 7.54(1H, dd, $J=8.4, 1.6\text{Hz}$, 6'-H), 6.90(1H, d, $J=8.4\text{Hz}$, 5'-H), 6.42(1H, d, $J=1.5\text{Hz}$, 8-H), 6.20(1H, d, $J=1.5\text{Hz}$, 6-H), 以上数据和文献[2]一致。

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